

ABSTRACT

Combustion turbines and other types of turbines, whether axial or radial flow, have significant amounts of kinetic energy left in the exhaust gas (working fluid) after the working fluid has been fully expanded to atmosphere. This invention eliminates the exhaust loss typical to both impulse and reaction stages by using externally and rotating nozzles attached to the periphery of the turbine wheel. These nozzles are perpendicular and circumferential to the turbine's centerline. The external rotating nozzles turn the wheel by the production of thrust that create a rotating torque on the turbine's centerline. By controlling the turbine's wheel translational speed to equal the working fluid velocity exiting the nozzle, the exhaust gas (exit) loss is eliminated. In addition, other losses associated with conventional stationary nozzles turbines such as cosine losses, clearance losses and potential "stall" are eliminated. The elimination of these losses allows for high efficiency single stage turbines operating only at the critical pressure necessary to produce sonic velocity in the throat of the nozzle. In this manner the pressure ratio is kept relatively low (at a theoretical 1.89:1) which increases efficiency by reducing the proportion of compressor work to gross turbine work. In addition, the efficiency is also increased since the low pressure ratio results in low heat of compression (low temperature at the compressor outlet) and allows for high amounts of recuperation.